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ABSTRACT

A program was developed to improve students' transfer of concepts and skills among content areas and to the world outside of the classroom. The targeted population was sixth and eighth graders at a private middle school of 250 students in a stable middle-class community in a suburb of Chicago (Illinois). Study of the school site and a literature review supported the conclusion that the causes of the problems students were experiencing was lack of the skill of transfer. This was due to a disconnected curriculum, neglect of the teaching of the skills of transfer, and insufficient time given to application. Three categories of intervention were selected based on a review of educational research. The intervention began with connecting the curriculum to a greater degree. A second effort was targeting specific skills such as persuasive writing, predicting, and organizing information through projects such as the study of ancient Egyptian civilization and understanding a constitution. A third intervention required student journal writing. Post study data indicated that students are capable of transfer and that a focus on this skill improves the ability to transfer information. With practice, students became more independent in recognizing the relationships that exist among various areas of knowledge. Four appendixes contain a student essay form, a pretest on analogies, an essay posttest, and a parent survey used to supplement the study. (Contains three tables and four figures.) (SLD)

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DEVELOPING TRANSFER IN MIDDLE SCHOOL STUDENT LEARNING

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An Action Research Project Submitted to the Graduate Faculty of the School of Education in Partial Fullfillment of the Requirements for the Degree of the Master of Arts in Teaching and Leadership

Saint Xavier University & IRI/Skylight
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May 1997

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Abstract

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Title: Developing Transfer in Middle School Student Learning

This report describes a program for improving students' transfer of concepts and skills among content areas and to the world outside of the classroom. The targeted population consisted of sixth and eighth grade middle school students in a stable, middle class community, located in a southwest suburb of Chicago.

The school site and the literature review support the cause of the problem being that students lack the skill of transfer due to disconnected curriculum, neglect of teaching the skill of transfer, and insufficient time given to application.

A review of solution strategies suggested by education researchers combined with an analysis of the setting of the problem resulted in the selection of three categories of intervention. The intervention included, first, connecting the curriculum to a greater extent. A second was targeting specific skills such as persuasive writing, predicting, and organizing information, and targeting concepts such as understanding of ancient Egyptian civilization and understanding a constitution. A third intervention required student journal writing.

Post study data indicated students are capable of transfer and with direct teaching this ability improves. With practice students became more independent in recognizing the relationships that exist among various areas of knowledge.

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CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

The students of the targeted 6th-grade classes and 8th-grade class have difficulty transferring knowledge from subject to subject and from classroom learning to their world outside of school. Students do not appear to make connections between learned concepts and skills. This difficulty is evident from teacher observations, results from McDougal, Littell's *Daily Analogies* practice, and from student essays requiring reflection on transfer.

Immediate Problem Context

Approximately 250 students attend this private Christian school. The school is comprised of grades six through eight with three classes per level. The population of the student body is 98% white with a strong Dutch heritage. The students live in areas extending from Joliet to Chicago. The majority of families belong to a Reformed church. Although specific financial data is not available, most supporting families are middle class. The tuition cost per child is $3,200.00; however, even this cannot be a predictor of family income because of the nature and the Christian perspective that the school maintains. There is a

tuition assistance program arranged by the Association and supporting churches which aids families who cannot meet the tuition cost. The school system as a whole is growing in number and diversity of religious affiliation.

The staff of the targeted school has a range of education from Bachelor's (six teachers) to Master's degrees (three teachers) and from 0 year to 35 years of experience. There are nine homeroom teachers within the middle school who are divided into three grade level teams. Two researchers are on the 6th-grade team which consists of three teachers, two female and one male. The experience of the two researchers is six and eight years. Their teaching responsibilities are math/science and history/Bible. The third researcher is on the 8th-grade team which consists of three teachers, one female and two males. The experience of the third researcher is five years. Her teaching responsibility is language arts and math. Specialist teachers are used in the areas of the media center, student resource, physical education, art, music appreciation, computer, band, and choir. These specialists are shared with the one high school and two elementary campuses which along with the middle school make up the Association.

The targeted school is in its third year of implementing the middle school philosophy. Two-thirds of the day is set up for block scheduling. The students' day is divided into three blocks of time instead of eight periods; this allows for flexible use of class time and subject approach. Grade level meetings are held

each day for teaching teams and support staff. Class sizes range from 24 to 31 students. Competitive sports teams and intramural programs are optional. An expanded exploratory program is offered the last period four days per week.

Integration of the curriculum is implemented at varying degrees at each grade level. The 6th-grade team attempts to relate subject areas by weaving them into the chronological order of the social studies curriculum. The strongest area of integration occurs between language arts and social studies. For example, novels are selected that will tie into the various cultures that are studied. At this point, few connections have been made among the other content areas. The 8th-grade team presently features two projects that connect two content areas of the curriculum.

The Association

The Association is a parent-run organization; parents fund and oversee the direction of the schools. The Association was originally set up according to and still holds to the Reformed live view which maintains that God is sovereign in all of life. Parents elect an 18 member Board of Directors. The Association has one superintendent and three principals who oversee a teaching staff of 68. Parent volunteer groups support teachers and promote fund raising projects for the school.

There are three different campuses within the Association. The high school has 400 students. Two hundred fifty students

attend the middle school, and 250 students attend one of the elementary schools. The other elementary houses 225 students.

The full teaching staff has a wide range of experience and educational background. The average number of years of experience for all teachers in the Association is 13 years. Over 50% hold a Master's degree. The average teacher's salary is $36,678.00.

National Problem Context

For the past decade transfer of knowledge and skills from one situation to another is an issue which has been questioned and explored. Transfer of learned skills such as reading or math often occurs at the level of rote memorization or mere remembering. When a child learns to read, this skill will be transferred later when the child is asked to read a social studies textbook or a novel. Similarly, the mastery of basic math computations in the classroom should lead to the ability of the student to balance a checkbook or calculate change at a store. These examples of transfer are literal and necessary; however, transfer also needs to happen at the level of understanding rather than merely rote learning.

Today's children live in a world in which the information explosion requires that citizens learn how to manage information, not memorize facts. To manage information, children need to learn not only content, but also processing skills and how to work in a cooperative teaming approach (Cameron, 1992). Marazano and Arredondo (1986) agree that education must change its focus

"to teaching the skills essential to accessing, organizing, and using information" since it is so difficult to predict exactly what factual knowledge students will need in the future.

Many schools tend to overlook the need to teach transfer. Education today assumes that if the setting is correct, all students will naturally transfer knowledge from one subject area to another and from school to everyday life. According to Perkins and Salomon (cited in Bellanca, Costa & Fogarty, 1992), very often in instructional settings--and in everyday life--we do not get the transfer we want. Learners acquire skills and knowledge in one situation, but fail to make connections to other situations in which those skills and knowledge would prove valuable.

It is especially difficult for teachers to make connections and pursue transfer in a setting where professional communication is limited. As Costa (1988) acknowledges,

> Teachers feel isolated. We are probably the only profession that performs our most beautiful and creative craft behind closed doors. Contributing to this situation is the inadequate amount and inflexibility of time for teachers to meet, plan, observe, and talk with each other. (p. 94)

Much of the classroom instruction is textbook driven with little focus on the level of transfer and understanding. Standardized testing and the need to cover the required curriculum is the immediate concern of teachers and administrators. The results of these tests are visible to the

community and play a role in educational financing and community support. What is taught in school need only be applied to the test. Bransford and Perfetto address this in their research which finds that knowledge gained in traditional school study formats tends to be inert (cited in Perkins & Salomon, 1988). Barrows and Tamblyn (1980) also found that medical students did not apply knowledge they learned in lectures and texts to real life situations.

Perkins and Salomon (1988) summarize what they perceive as the essence of the problem: traditional schooling does nothing to facilitate transfer, but expects it to happen. When transfer does occur, it is usually by chance.

CHAPTER 2

PROBLEM DOCUMENTATION

Problem Evidence

The problem of students' not transferring concepts and skills was determined by assessing students' essays in September. Another measure of the problem was the Daily Analogies test.

In September students completed an essay which prompted them to make connections between what happens at school and every day life. (Appendix A) The essays were assessed according to the degree or type of transfer. The types are defined in Table 1.

Table 1

Types of Transfer Used for Scoring Transfer Essays

Type	Description
Match	An activity or skill from school is matched to an experience outside of school. Ex. We eat lunch at school and at home.
Apply	A skill or concept learned in school is used in another setting. Ex. Because I learned about drugs in school, I was able to help a friend.
Predict	A prediction is made for when a skill or concept learned in school may be used in the future. Ex. I will use math when budgeting.
Extend a Comparison	An analogy is made and explained comparing a skill or concept learned in school to an experience outside of school. Ex. Teachers are like parents because they guide us and help us solve problems.
Create a New Idea	An original idea is created by synthesizing a skill or concept learned in school to an experience outside of school. Ex. Life is like a mosaic; the pieces only make sense when viewed as part of the whole.

Essay results are given in Table 2. The prompt was somewhat leading so most of the students were able to achieve some level of transfer. However, a response such as "I use the computer at school, and I use the computer at home," was not uncommon. Perhaps age has some connection with one's ability to transfer, since eighth graders were able to transfer at a higher level than sixth graders.

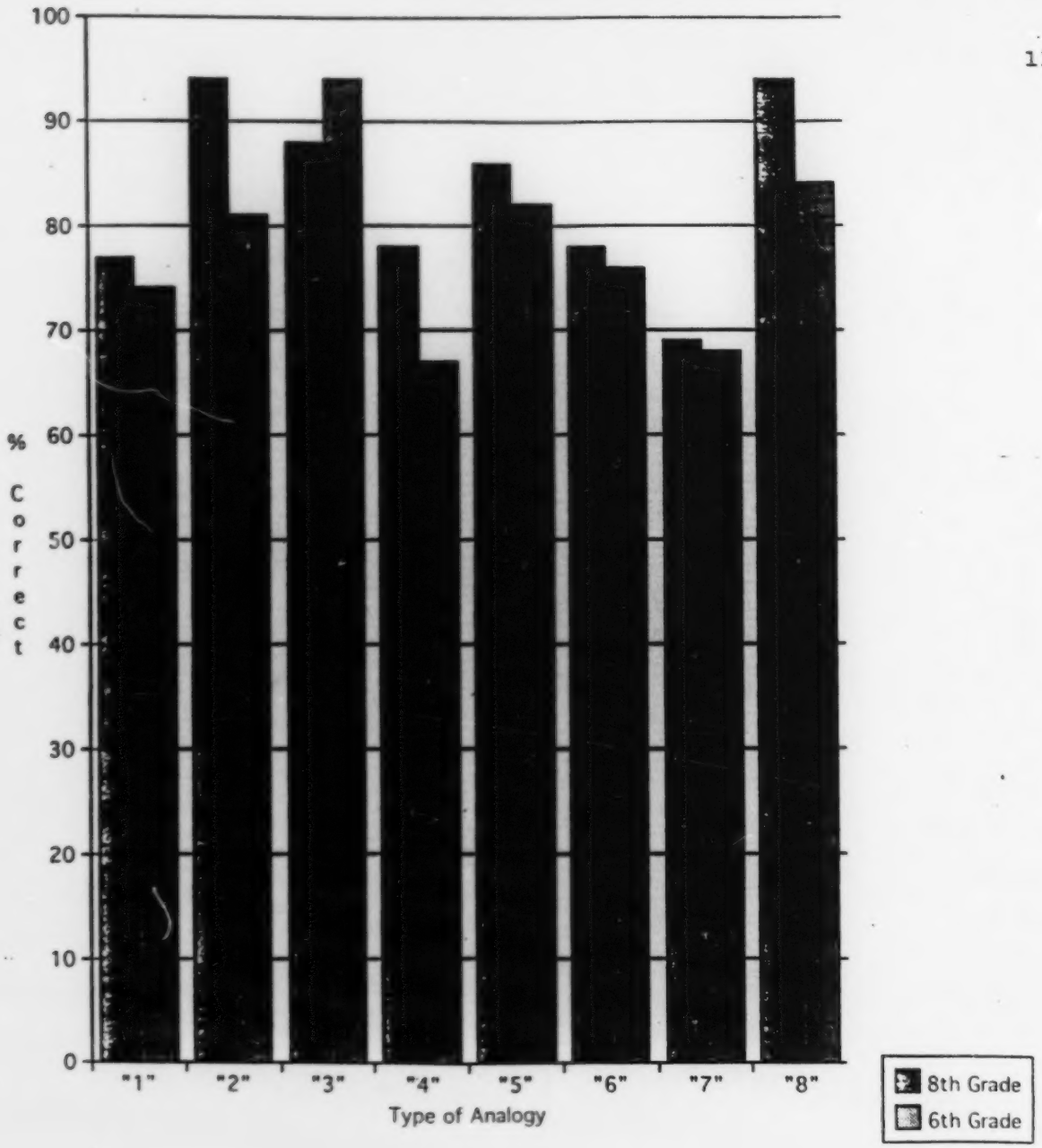
Table 2

Transfer Essay Results

		Type of Transfer					
Group	n	None	Match	Apply	Predict	Extend	Create
6th Grade	30	3	17	10	0	0	0
8th Grade	22	1	7	9	3	2	0

Also in September students completed a general analogies test compiled from a sampling of items from McDougal, Littell's *Daily Analogies* (Appendix B). The thirty-five item multiple choice test had eight types of analogies: grammar (aren't : isn't :: _____ : doesn't), agent/object-action (composer : symphony :: _____ : novel), action/object (boil : _____ :: freeze : ice), math-part/whole (25% : 1/4 :: _____ : 2/5), synonym-antonym (lose : recover :: _____ : remember), characteristic-class (touch : see :: tangible : _____), temporal-location (Arctic : north :: _____ : south), and object/function (_____ : bake :: knife : slice).

Results are graphed in Figure 1. The bars on the graph depict the percentage of correct responses of both sixth and eighth graders. Each set of bars represents a type of analogy. All students had difficulty with location items. Sixth graders had particular problems with math-part/whole items. Eighth-grade students earned an average score of 29.1 items correct out of thirty-five; sixth-grade students earned an average score of 27.8 items correct out of thirty-five.



"1" = Grammar
"2" = Agent/Object & Agent/Action
"3" = Action/Object
"4" = Math & Part/Whole
"5" = Synonym & Antonym
"6" = Characteristic & Class
"7" = Temoral & Location
"8" = Object/Function

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Figure 1 Analogies pretest results

Site-based Probable Causes

There appear to be at least four site-based causes for students' lack of transfer of concepts and skills.

The first cause may be a disconnected curriculum. Recent efforts have been made to organize and sequence each content area's curriculum so they complement one another, but the curricula are still distinct. With this situation teachers frequently expect students to connect the concepts or skills they have learned in one classroom to the concepts and skills they are learning in another. However, teachers often hear students comment with surprise that they have talked about this concept or topic in another class also. Apparently, students expect compartmentalization of curricula to be the norm.

A second cause for the problem of lack of transfer at this site may be that teachers are unaware of potential connections between content areas. Each of these three teachers is responsible for teaching a different subject. Although, they are given time daily to work with their grade level teams and do take advantage of this time to share what is happening in each classroom, they do not thoroughly know the content of each other's curriculum and are not always aware of connections that could be drawn. Even when writing and reviewing curriculum, teachers are not expected or encouraged to consider other content areas or curricula.

A third cause may be that teachers do not teach the process of transfer. By examining any curriculum guide, one can observe

that content is the focus of any subject rather than a transferring process which can be adapted to other situations. Each of these three teachers hopes their students transfer knowledge and skills to situations well beyond their classroom walls, but the process of transfer is not taught.

A fourth cause for students' lack of transfer may be that teachers do not give students opportunity to transfer. Like many curricula today, the curriculum each of these three teachers manage is full of valuable objectives. Full is the operative word. Certainly time is always found or made for new ideas and the three do not feel constrained by the curriculum, but currently time is not being allotted to transfer practice.

Literature-based Probable Cause

Discouraged by negative findings in transfer research, some theorists have concluded that the cause of students' lack of transfer is that the human brain simply does not do it well (Fogarty, Perkins, & Barell, 1992). It has long been a theory that subjects such as Latin and geometry "train the brain" for learning and thinking, that organization and logical thinking are unavoidably taught through the content. However Thorndike (1906) produced research that suggested that study in these subjects does not transfer broader thinking skills. More recently, researchers have examined the transfer abilities of students to solve problems. Students who had learned to solve problem A were not able to solve problem B, even though they had similar structures. Perhaps by default, these researchers have concluded

"that learning is inherently context specific" (Fogarty, Perkins, & Barell, 1992, p. xv).

Perkins (1986), however, credits schools' disconnected curricula as the cause for students' lack of transfer. Skills and concepts are taught with no connection to the purposes that make them meaningful. Math, social studies, grammar, computers, foreign language, are all taught within the walls of the classroom and teachers do not require students to carry these concepts out the door of the classroom, let alone out the door of the school building. Perkins draws this analogy (as cited in Perkins and Salomon, 1991, p. 6),

> Educators often seem to adopt a kind of "chocolate box" model of learning; they attempt to put more isolated chocolates of diverse flavors into the expanding chocolate box of the mind. Unfortunately, this is not how the mind works.

Perkins (1986) identified two classroom situations that foster students' reluctance to transfer knowledge. First, teachers assume that students will automatically transfer what they learn, both knowledge and skills, to other appropriate contexts. This is known as the Bo Peep theory: "Leave them alone and they'll come home wagging their tails behind them." Teachers assume likewise; that if the content is taught and sufficient practice is given, then transfer of learning will automatically follow (as cited in Fogarty, Perkins, & Barell, 1992). Second, many teachers do not encourage students to make thoughtful

connections. In 1988 and 1989 in studies of students' ability to transfer knowledge, Perkins and Salomon found that students do transfer knowledge (as cited in Fogarty, Perkins, & Barell, 1992). Much of this transfer is simple, spontaneous, reflexive transfer of knowledge; it occurs when students have had time to practice and "automize" the knowledge or skill and the new situation is clearly similar to the original learning situation. However, more significant transfer relies on the teacher's prompting, guiding, fostering, or shepherding of it, hence, the Good Shepherd theory. Fogarty, Perkins, and Barell (1992) summarize,

> More thoughtful deliberate transfer tends not to occur unless the learning experience encourages students to be thoughtful to seek generalizations, to look for opportunities to apply prior knowledge, to monitor their thinking, and ponder their strategies, for approaching problems and tasks. Unfortunately, most instruction does not highlight this thoughtful side of learning. (p. xvi)

Closely related to this disconnected curriculum is the absence of time for students to make connections or to transfer prior knowledge to a classroom situation or to transfer new knowledge to life outside the classroom. Perkins and Salomon (1991) cite this as another reason students do not transfer learning. Students are simply not allowed the time to deeply understand information and go beyond. They do not have

opportunities within the classroom to develop insights and perform and refine their understandings.

Clearly there are several possible causes for students' tendency to not transfer knowledge. Teacher experiences at this site support researchers' suspicions that lack of instruction, a disconnected curriculum, insufficient time, and teacher assumptions hinder students' transfer of knowledge.

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

The literature suggests several interventions for teachers to apply for developing students' transfer of knowledge. The following interventions are described in detail in the subsequent paragraphs: a) connected curriculum, b) providing necessary opportunity for practice, c) teaching thinking skills, d) cuing, hugging, and bridging, and e) cognitive organizers.

Connected Curriculum

To avoid "letting knowledge accumulate in isolated puddles within students' minds," Perkins and Salomon (1992, p. 208) suggests educators work toward a connected curriculum. Subjects and skills are not isolated from each other; on the contrary, they are related. Content should be carried and connected from one discipline to another. Skills which are taught, such as paragraphing or comparison/contrast, should be used in a variety of forms and expressions. By using a connected curriculum, the original purpose of concepts is not lost, but given greater meaning (Perkins & Solomon, 1988).

On a broader scope, the curriculum should also be connected to students' lives outside of school. Content and what is discussed in the classroom should be transferred to what happens in the news, to shopping experiences, to figuring out baseball statistics, or to a situation which requires creative problem solving. Instead of isolated facts which students learn and keep within one classroom, a connected curriculum fosters a classroom where there is learning and then lends to transfer of this knowledge to situations in other classrooms and beyond the school walls.

Providing Necessary Opportunity for Practice

Allowing for time in the classroom for students to transfer new knowledge to various situations is another strategy. Perkins (1991) writes, "the act of transfer is an understanding performance" (p. 5). When transfer occurs and connections are made, students have an understanding of a new concept. This is more than being able to recall information for a test. For transfer to happen it is necessary to move away from rote memorization and reproducing information. Instead, students are given the opportunity to develop an understanding of material which is then demonstrated with performance. It requires that education "goes beyond the information given" to allow for generalizations to be made, analogies drawn, and examples created (Bruner, p. 218, 1973). Higher level thinking skills take time to develop, but when these types of performances are demonstrated, transfer of knowledge occurs.

Teaching Thinking Skills

If the goal is improvement of transfer and other thinking skills, most educators and researchers agree that these thinking skills must be taught. All are not in agreement, however, on how these should be taught. Some, including Feurerstein, Lipman, Pogrow, and Will, offer a separate curriculum (cited in Bellanca and Fogarty, 1992). DeBono (1983) agrees that teaching thinking within content may be more efficient, but not effective. He clearly explains, "Either one wishes to teach thinking effectively or merely to make a token gesture. Attending to content distracts from attending to the thinking skills being used." (p. 706). Such models give students practice in thinking skills, but rely heavily on teachers to push students to transfer these skills to other areas of the curriculum.

Most educators now agree that the teaching of thinking should be "infused" or woven into the regular curriculum. (Mirman & Tishman, 1988; Bellanca & Fogarty, 1992; Perkins & Swartz, 1992). "[Education's] focus is always and foremost on the transfer of learning for all children, and the infused model eases the way for fruitful transfer, creative application, and relevant student use throughout the curriculum." (Bellanca & Fogarty, 1992, p.3). The infused model is not a burden on the already loaded curriculum because existing content is the vehicle for instruction. Unfortunately, many teachers may be hesitant to adopt an infused model because they are unskilled in teaching thinking skills. (Bellanca & Fogarty, 1992).

Models for Teaching Thinking Skills

Several educator/researchers have developed models for teaching thinking skills for teachers to follow. Although the models for teaching thinking skills vary greatly, they are not necessarily contradictory; the various models are simply the results of differing justifications. (Coles & Robinson, 1989). Bellanca and Fogarty (1992) cluster these models into four types: Model Building with Prototypes, Strategic Skills Approach, Conceptual Models, and Curriculum Packages.

Each model has strengths and weaknesses, but the model Building with Prototypes seems to offer the greatest support for teachers concerned with transfer. In this model a thinking skill prototype is presented in a content-specific lesson with the implicit understanding that this prototype must be developed through practice in future lessons. This model is better understood by looking at a specific example.

Perkins has developed a Building with Prototypes program called "Connections." (cited in Mirman & Tishman, 1988). The strategy, a three to five step process that guides students in a thinking skill, is introduced in a "kick-off" lesson which is content rich. The program then guides the teacher in weaving this strategy into future regular lessons. For example, to bring a decision-making strategy into the classroom, a teacher selected an important turning point in history: Truman's decision to drop the atomic bomb. After his students read about this event, he guided them in the decision-making strategy to Truman's choice of

whether or not to drop the bomb. First, the class reviews the steps of the strategy: 1) find creative options, 2) list reasons for and against the most promising options, and 3) make a careful choice. Students then work through this process to come to their own decision. Over the next few weeks the teacher will ask students to implement this strategy in many other situations.

Roberta Jackson (1986), an 8th-grade language arts teacher in Virginia, developed her own deductive model for teaching thinking skills when she realized how dependent her students were on her for guidance in thinking. Her five step model includes introducing, explaining, demonstrating, applying, and reflecting on a skill. After this direct instruction, she observed a significant number of her students regularly and independently using the thinking skills they had learned. In fact, colleagues took notice of her successful model and asked her to share the details with them.

The Strategic Skills Approach also has great potential for addressing the thinking skill of transfer. Unlike the Building with Prototypes program, the Strategic Skills Approach introduces strategies and skills in a content-free lesson and then the teacher is responsible to continue implementing the strategy in future content-rich lessons. Bellanca and Fogarty's Catch Them Thinking (1986) is an example of a source for these content-free lessons which teachers may bring into their classrooms. Bellanca and Fogarty (1992) caution teachers to not regard these content-free activities as simply Friday afternoon

fillers. Teachers must be sure to return in future content lessons to the skills introduced in the initial content-free lesson. This final step of applying and practicing the skill in additional lessons is crucial for this truly to be a strategy and not just another isolated activity.

The final two models are the Conceptual Model and Curriculum Packages. In the Conceptual Model, improvement of thinking skills is the objective of the curriculum, and traditional content may be used to meet these objectives. This model requires a great commitment from teachers to change their entire framework for teaching, but it establishes a climate conducive for thinking.

Curriculum packages, such as deBono's CoRT program (deBono 1983), provide materials which are specifically designed for explicit instruction distinct from any content area. These packages, although complete with ready-to-go thinking lessons, do not require teachers or students to transfer these skills to the rest of the curriculum. DeBono has designed sixty thinking lessons to teach operating tools that are useful and easy to use. He explains that when thinking is distinctly taught, it can be viewed by teachers and students as a skill which students can improve. Using the CoRT method a teacher introduces a thinking tool with minimal instruction and allows students to work with the tool in a content free discussion. The students then continue to employ this tool in several different situations in the same lesson, so that the tool remains the focus, not the content. Once skill using the tool is developed, deBono explains

that students can apply the tool in other situations, and he reports that from his experience that this application does occur. The CoRT program has been widely and successfully used around the world by both schools and businesses.

Cuing, Hugging, and Bridging

Cuing, hugging, and bridging are three techniques teachers can utilize to encourage transfer of learning from one situation to another. Cuing mediates transfer by prompting students with questions appropriate for the student's current level of transfer. The question may either initiate a basic connection or extend a connection that the student has already made. To effectively cue students, teachers must be aware of each student's current level of transfer so appropriate cues can be given. For example, if a student successfully completes a "drill and skill" worksheet but then stops executing the skill, a teacher may ask, "Can you think of an adjustment you can make so that this idea is useful in another context?" (Bellanca & Fogarty, 1992).

Hugging is a second mediation for transfer. Hugging means to make the instructional setting as similar as possible to the situation where the skill or knowledge may be applied (Perkins & Swartz, 1992). This technique expects teachers to anticipate where skills and knowledge may be transferred. A number of techniques facilitate hugging: matching, simulating, modeling, and problem-based learning. (Fogarty, Perkins, & Barell, 1992).

Bridging is a third mediation for transfer. It does not require teachers to make connections and then alter the learning environment; it requires teachers to facilitate the transfer process in students. Perkins and Swartz (1992, p.66) explain, "with the guidance of the teacher, students make generalizations about what they are learning, anticipate possible applications, and compare different circumstances analytically." There are a number of techniques that facilitate bridging: anticipating applications, generalizing concepts, using analogies, parallel problem solving, and metacognitive reflection. (Fogarty, Perkins, & Barell, 1992).

Cognitive Organizers

Familiar and unfamiliar information is often part of a school's curriculum for students of all ages. One practical strategy for assisting the student in recalling and retaining content is Ausubel's theory of cognitive organizers. Strom and Bernard (1982), on Ausubel, explain,

> advance organizers are theories, structures, propositions, or statements of what one will be able to do when the learning is completed. The learning of new material is facilitated by advance organizers. They suggest the relevance of the new material to what the learner already knows (p. 494).

This advocates direct teaching with an emphasis on meaningful verbal instruction. Strom and Bernard continue, "Being told verbally how to perform a physical act (dance, swim, play golf)

may save much time later, because the learner does not have to correct any handicapping habits that often result from just plunging in" (p. 494). Cognitive structuring of new material learned already begins before any performance or application has been attempted.

Cognitive organizers promote the development of organizational skills for students. Mapping and creating graphic organizers make thinking visible for students and teachers. Lyman and McTighe (as cited in Bellanca and Fogarty, 1992, p.9) suggest that cognitive maps help students "relate new information to prior knowledge."

PROJECT OBJECTIVES and PROCESSES

As a result of increased instructional emphasis on the skill of transfer during the period of September 1996 to February 1997, the 6th-grade students and the 8th-grade students from the targeted group will improve their transfer skills as measured by an essay requiring transfer and an analogies test.

In order to accomplish the terminal objective, the following processes are necessary:

1. The teachers will assess and realign the existing curriculum where it is necessary in order to improve the connectedness of the subject areas.
2. The process of near and far transfer of both concepts and skills will be infused into the curriculum.
3. Journal entries that address far transfer of concepts will be used in all content areas.

PROJECT ACTION PLAN

The solution strategies will begin before the 1996 school year begins and continue throughout the first semester.

I. Assessment and realignment of the 6th-grade and 8th-grade curricula are necessary to connect the content areas and to enable transfer of concepts for teachers and students.

A. Assessing the Curriculum

During the past two years, the 6th-grade teaching team has worked towards organizing the curriculum. Novels in language arts are related to what is taught in social studies. For example, Year of Impossible Goodbyes by Sook Nuyl Choi, a story set in North Korea during the 1950's is read while studying the cultures of Asia in social studies. However, there are many areas where connections have not been made especially in math and science. This year the school is adopting a new science curriculum, "Science Plus" and see this as an opportunity to develop the possible connections. The 8th-grade teaching team is currently restructuring their curriculum, recognizing that in the past it has been very disconnected.

B. Realigning the Curriculum

The 6th-grade curriculum will focus on connections between language arts and science. Writing skills taught in language arts will be transferred into the process of making predictions and lab and analysis reports. In each science

unit students will be asked to weekly make written predictions for experiments as they practice the scientific method. Each weekly experiment will also be accompanied with a lab report in outline form, and students will be required to reflect on the accuracy of their prediction. Along with writing, novels and children's literature will be used to enhance the science curriculum.

The 8th-grade curriculum will focus on connections within language arts and between language arts and social studies. In September and October in language arts students will read True Confessions of Charlotte Doyle by Avi, a novel that has clear themes of rights of the people, the effect of power, and taking a stand. During these same months in civics, students will be studying the development, the importance, and the details of the U.S. Constitution. These two classes should connect when students write a constitution for the crew of the Seahawk, the fictional ship they read about in language arts. In November and December in language arts students will read The Giver by Lois Lowry, a novel that has themes of societal interdependence and our need to remember the past. These themes will be discussed as well as the concept of a society's structure. Students will compare and contrast the hierarchical structure in The Giver to the democratic structure in the U.S. In January in language arts students will read John Steinbeck's The Pearl; this novel will connect back to

students previous work with parables and loyalty discussions in Bible class. Finally, in February in language arts students will read one of three novels in literature circles. Two of the options will be novels set during WWII. These novels will help prepare students for their study of WWII in March in social studies.

C. Monitoring the Connections Between the Curriculum

All middle-school teachers meet each day as grade level teams to plan and to discuss the progress of students. This time will be used during the school year to keep informed of what is happening in each classroom and to make connections which would allow for transfer. These discussions will aid the teachers in helping students make connections between subjects.

II. Skills and concepts will be targeted for near and far transfer. Near transfer is immediately applying a new concept or skill within the classroom in which it was taught. Far transfer is applying a learned concept or skill in any classroom without reteaching. Instead of teaching these skills separately from content, transfer will be woven into the established curriculum. (Figure 2) The model which this most closely follows is the Building Prototype Model where the thinking skill is taught in content specific lessons with the understanding that it must be practiced and developed in future lessons.

A. Persuasive writing, predicting, organizing information, and drawing analogies are skills which will be targeted.

B. Understanding ancient Egyptian civilizations and understanding the purpose and structure of the constitution are concepts which will be targeted.

Skill or Concept	Near Transfer	Far Transfer
Persuasive Writing	- introduce students to persuasive essays (6th-grade in November and 8th-grade in September) and allow opportunity for students to practice writing persuasive essays in language arts	- apply persuasive writing skills to other units of the curriculum in other classrooms (6th-grade social studies in Egypt unit in December, 8th-grade Civics in October)
Predicting	- teach (6th- and 8th-grades in August) and practice the skill of predicting in science (6th- and 8th- grades continuing)	- make predictions in other content areas (6th-grade social studies while studying political systems of various ancient cultures, 6th- and 8th grades language arts throughout three novel studies)
Organizing Information	- teach formal notetaking and mapping in 6th grade social studies (mapping in September, webbing in October, informal outline in November and December) and 8th grade language arts (mapping and formal outlines in literature August)	- demonstrate an ability to organize information in other content areas (6th-grade science: mapping in September and October, outlining in February; 8th-grade composition: mapping in September and December, outlining in December; 8th-grade social studies throughout)
Drawing Analogies	- complete Daily Oral Analogy samples during homeroom time	- formulate analogies using new information with prior knowledge (6th- and 8th-grade questioning strategy)
Egyptian Civilization 6th Grade	- demonstrate an understanding of religion, social structure, and contributions (social studies November and December)	- observe a relationship between concepts in social studies to skills taught in math, science, language arts, and art (math and science: geometry, pyramid building, graphing of river lengths; language arts: research, recorded information on informal outline, read The Golden Goblet; art: designed life-size mummy cases; social studies: recognized the purpose of monuments and wrote about contemporary monuments; all in November-December)
Constitution 8th Grade	- demonstrate an understanding of the structure and purpose of the United States Constitution (social studies August and September)	- write a constitution for a fictional crew pertaining to True Confessions of Charlotte Doyle, a classroom novel read in 8th grade language arts (August-October)

Figure 2. Matrix for targeted skills and concepts.

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III. The third strategy employed will be the use of journal writing. The 6th-grade and 8th-grade students will be using journal stems to write about their new knowledge and where they see transfer of this knowledge. Stems will be general, such as, "I learned..." or "I wish..." or "I will..." Students will be encouraged to look for far transfer among the content areas. A goal which educators are always seeking is students' transfer of knowledge to their world outside of school. This extended transfer will also be promoted in students' journal writing.

METHODS OF ASSESSMENT

In the fall an essay will be assigned and an analogies test will be administered to determine student's ability to transfer their knowledge to other situations. Upon completion of the interventions of various strategies, the identical essay will be assigned and a similar analogies test will be given. The pre- and post-test results will be compared to determine the amount of change that has occurred.

CHAPTER 4

PROJECT RESULTS

Historical Description of Intervention

The objective of this project was to improve students' transfer of concepts and skills among content areas and to the world outside of the classroom. The intervention chosen to meet this objective was comprised of three elements: assessing and realigning the curriculum, infusing the teaching of transfer into existing curriculum, and requiring student reflective journaling.

The sequence of the 6th-grade curriculum and the scope and sequence of the 8th-grade curriculum were assessed in the earliest phase of the action plan. Units were realigned to maximize potential for transfer; for example, novels were scheduled to correspond with related social studies units. Teachers met with grade-level colleagues daily to monitor and promote the inter-relatedness of the curriculum.

Four skills and one concept were targeted per grade level for both near and far transfer. Near transfer refers to the application of a skill or concept within the content area in

which it is taught. Far transfer refers to the application of a skill in another content area without reteaching. The Building Prototype Model used to teach transfer was most closely followed.

The four skills were persuasive writing, predicting, organizing information, and drawing analogies and two concepts were Egyptian civilization and a constitution. Persuasive writing was taught in language arts in the fall; within one month students applied persuasive writing skills in the social studies classroom. The skill of prediction was practiced in science in August; throughout the study students made predictions in literature and social studies. Several methods for organizing information were taught during the study; as each method was taught, it was reinforced in other classrooms. Daily oral analogies were completed daily during homeroom time; by October analogies were used regularly as a hook or closure for classroom lessons.

Sixth-grade students studied the Egyptian civilization in November and December. Along with the study of this ancient culture, students did a study on monuments around the world; students compared and contrasted the original intent of the monuments and the purpose which they serve yet today. The unit was integrated beyond the social studies classroom and promoted the transfer of newly learned knowledge to language arts, art, math, and science. In language arts students conducted research, recorded information on a formal outline, and read The Golden Goblet by Eloise McGraw. In art students felled in an Egyptian

shaped figure with the research information and designed life-size mummy cases. In math and science students studied geometry and pyramid building and graphed river lengths. Eighth-grade students studied the U.S. Constitution in civics; then students wrote a constitution pertaining to fictional characters in the novel True Confessions of Charlotte Doyle. Targeting these skills and concepts gave specific direction for the teaching of transfer to students.

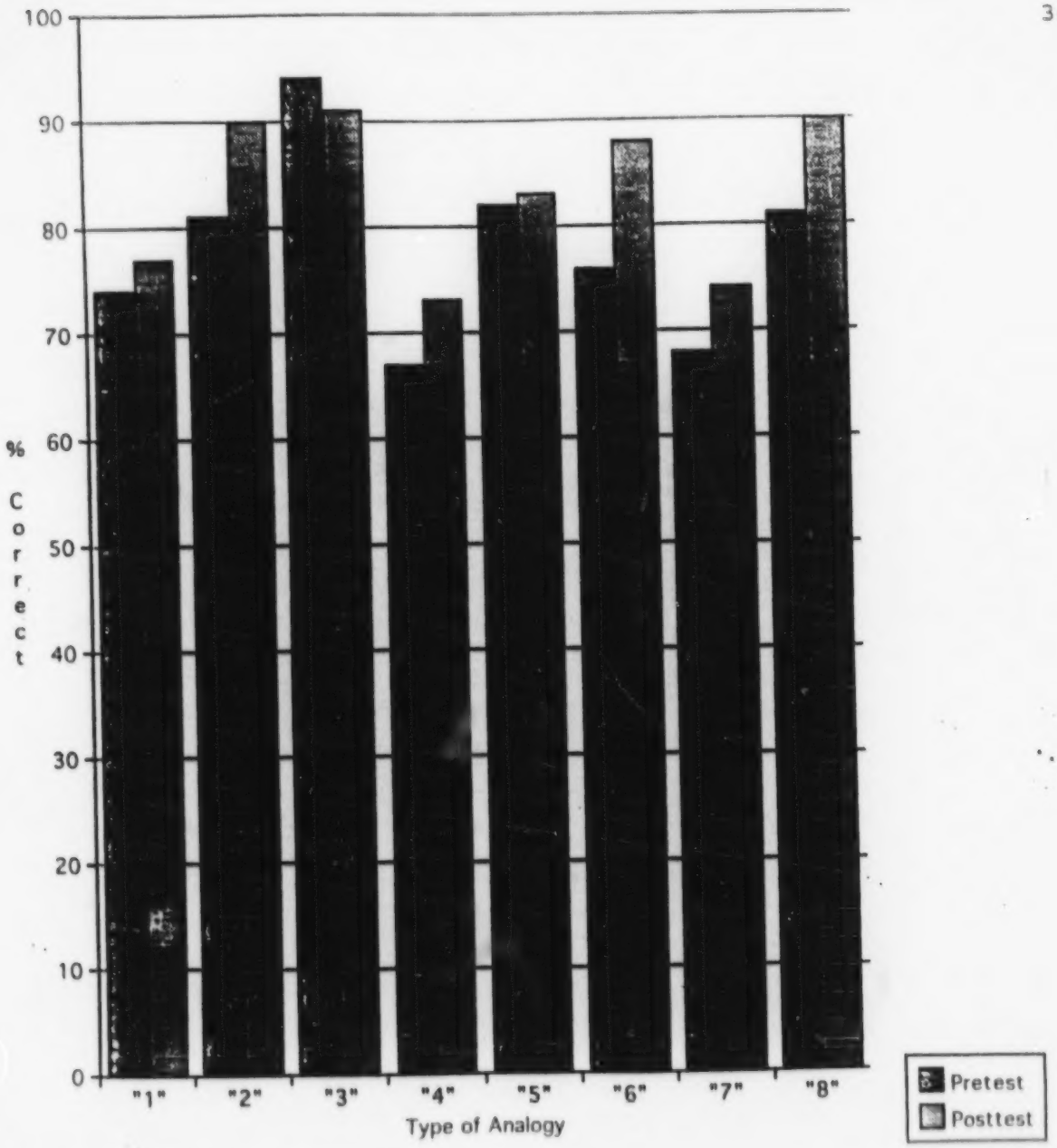
The original plan stated that students would complete journal stems to write about their new knowledge and make connections. This would be an opportunity for students to transfer what they have learned in the classroom to other classrooms and to their world outside of school. The technique which was utilized in these activities was bridging where teachers facilitate the transfer process in students. Realizing the limited responses that journal stems many times elicit, students instead were asked to complete frequent reflective logs.

Bridging, teachers guiding students in making generalizations and applications, can be accomplished through metacognititive reflection. Two types of reflection logs were used. The first type, completed at the end of the day or the end of class, required students to reflect on what they learned that day, "Three things I learned today..." The second type, completed at the end of a project, required students to reflect on their work process and product and how the knowldedge gained can be applied to other classes and life outside of school.

Reflection writing which promotes metacognition is closely related to the ability of the student to transfer knowledge. These logs encouraged metacognition and recognition of the connections that exist between learning and living.

Presentation and Analysis of Results

In order to assess the effect of daily analogy practice on students' ability to transfer, a teacher created general analogies pre- and posttest was administered. Scores from the posttest were compared with baseline data. (Figures 3 and 4). Overall scores of the sixth graders improved; the average raw score increased from 27.8 to 29.9. The one type of analogy where scores dropped slightly was action-object analogies. Overall scores of eighth graders also improved; the average raw score increased from 29.1 to 31.3. Although students were given multiple choice options for the pre- and post- analogies tests, classroom practice relied heavily on thinking and vocabulary because no options were given to complete analogies.



"1" = Grammar
"2" = Agent/Object & Agent/Action
"3" = Action/Object
"4" = Math & Part/Whole
"5" = Synonym & Antonym
"6" = Characteristic & Class
"7" = Temoral & Location
"8" = Object/Function

Figure 3. 6th-grade analogies pre- posttest comparison

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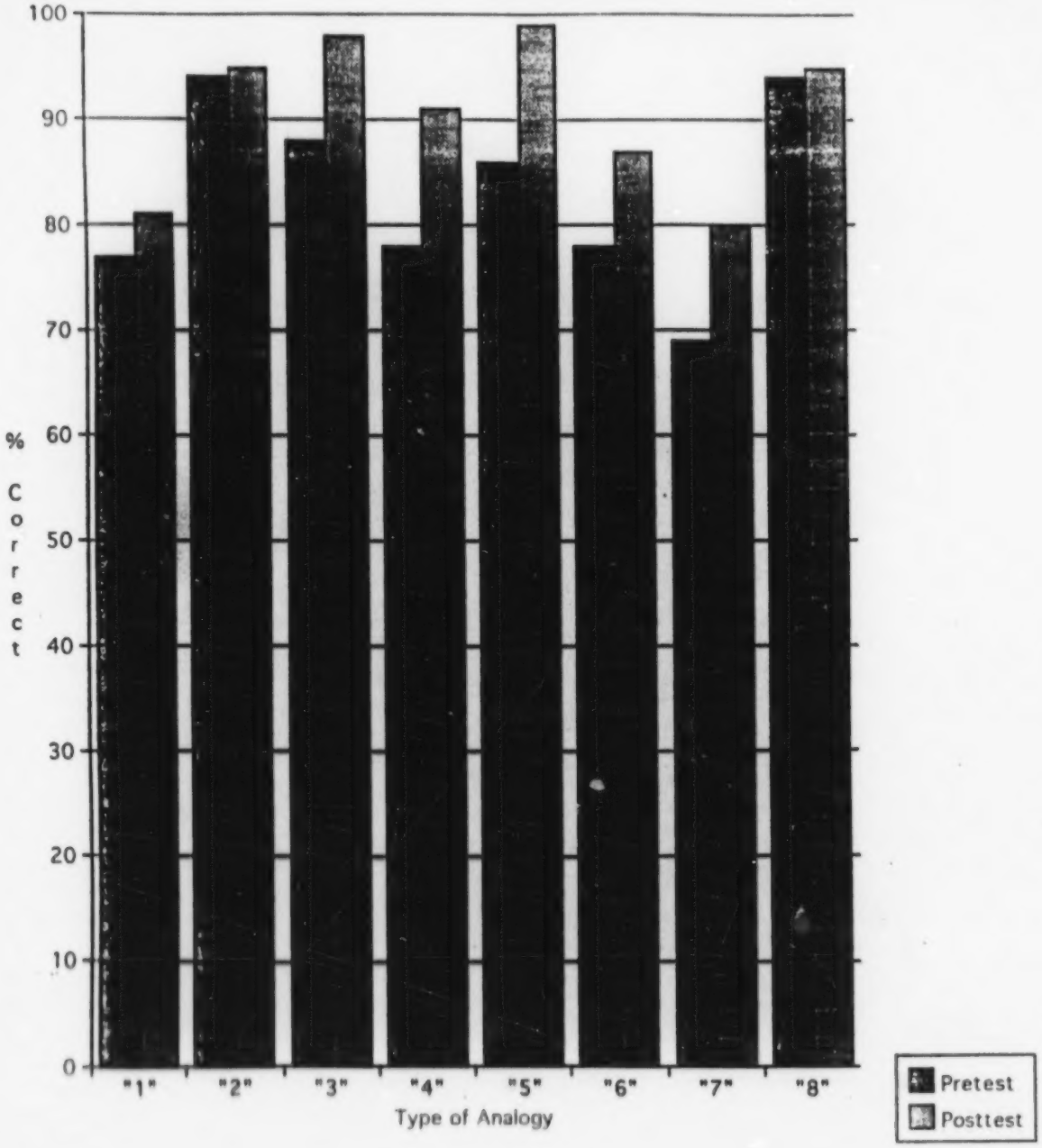

"1" = Grammar
"2" = Agent/Object & Agent/Action
"3" = Action/Object
"4" = Math & Part/Whole
"5" = Synonym & Antonym
"6" = Characteristic & Class
"7" = Temoral & Location
"8" = Object/Function

Figure 4. 8th-grade analogies pre-posttest comparison

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In order to assess the entire effect of transfer intervention strategies, students responded to an essay prompt in the beginning and end of the study. For the posttest students were asked to reflect back on this year's learning and identify connections between classrooms and between the classroom and life outside of school. (Appendix C) Pre- and post- essay rankings are compared in Table 3.

Table 3

Comparison of Transfer Essay Results

		Type of Transfer					
Group	n	None	Match	Apply	Predict	Extend	Create
6th grade pre	30	3	17	1	0	0	0
6th grade post	30	0	8	19	0	3	0
8th grade pre	22	1	7	9	3	2	0
8th grade post	21	0	0	17	4	0	0

Initially many students in the pretest essay were able to match specific skills used in one area to other areas requiring the same skills. For example, many students noticed that they add in math and they add their money for hot lunch. By the end of the study most students had moved to the next level of transfer and were able to identify where they applied skills in a variety of contexts. For example, a student noticed that he applied lines of symmetry learned in math class to an art project.

The prompt used for the posttest essay differed slightly from the pretest prompt. Through reading and work on this research action project, the need for a more thorough and specific prompt was recognized by the researchers. Students were reminded of the terms near and far transfer before completing the posttest essay.

In order to obtain a broader perspective on students' transfer of knowledge from the classroom to life outside of school, parents were asked to complete a survey pertaining to their child's thinking (Appendix D). Although not part of the original plan, parents were asked two questions, "In what ways have you noticed a change in your child's thinking over the past six months?" and "In what areas have you seen your child transferring the knowledge he or she has gained in the school setting to home situations?"

Response to the survey was optional. A third of all parents responded. Responses to the first question ranged from noticing no change to observing a movement from concrete to abstract thinking. Another change that a majority of parents noticed is that their children are able to look at issues from different perspectives. In response to the second question regarding specific situations where the child has bridged knowledge from school to home, parents offered many examples. Parents shared that their children have commented on the architecture downtown and related it to what they learned about ancient Greece, political elections in November and connected it to what they

learned in civics, and even germs in the kitchen and what they learned in science.

The responses indicate that students' thinking has further developed to include the ability to transfer and parents have recognized this growth. This development may be due to the intervention strategies; however, it could be attributed partially to a natural maturity of the students. Some parents perceived age as the primary cause for change.

Reflection logs were used as a means to prompt students to connect new knowledge to other classroom and life experiences. When students were prompted, they were capable of bridging the "isolated puddles" (Perkins 1992) of knowledge in their minds. In their logs students frequently made practical application of concepts learned in the classroom.

A final measurement for a change in the frequency and depth of transfer was teacher observation. The teachers noticed an increased ability on the part of the students to recognize relationships between learning experiences. As the study progressed, students began to initiate the connecting of ideas and information; they understood the need to make these connections. For example, a student noticed similarities between the community in a novel and the community in which students live. Another student made an analogy about the role of the church during different times in history: the church of the middle ages served as a main dish, the church of today serves as a side dish. Students brought in relevant, yet not directly

related, ideas to classroom discussions. Artifacts such as newspaper articles, computer print-outs, objects, and books were brought from home.

Conclusions and Recommendations

Based on the presentation and analysis of the data on students' ability to make connections, the students showed an improvement in their transfer abilities. Analogy pre- and posttest scores reflected an increased proficiency in detecting relationships among concepts. Comparison of pre- and post-transfer essays also revealed an improvement in transfer. An improvement in students' ability to transfer independently was also evident from their reflective writing. Parent surveys indicated a noticed change in students consciously thinking about connections outside of the classroom, but gave various causes for this change. Observation by the teachers, informal listening and class discussion, underscored the research and supported the conclusion that the interventions positively affected students' ability to transfer.

Students are capable of transferring knowledge. The findings from these teachers support Perkin's understanding of how the mind works. The mind need not store knowledge as isolated pieces of information (as cited in Perkins and Solomon, 1992) Transfer happens within a classroom, from one classroom to another, and from the classroom to life outside of school. This capability of the student is often not developed by teachers;

instead teachers assume students are making connections. Transfer needs to be taught and practiced.

Transfer needs to be taught. There are a variety of models for teaching transfer. Bellanca and Fogarty, (1992) cluster these models into four types: Model Building with Prototypes, Strategic Skills Approach, Conceptual Models, and Curriculum Packages. This team of teachers focused on infusing the skill of transfer into their modified curriculum which is most closely related to the Building Prototypes model. Positive results were gained by using this method, but better results would have come from using a combination of models. Teaching for transfer using both direct instruction and infusion into the curriculum is necessary.

Teaching for transfer is a process. First students need to be shown where connections exist, then prompted to identify connections themselves, and finally moved toward independent application. Without these steps, most students will not independently use their capabilities to transfer.

The study confirmed the value of implementing, within a school's total curriculum, instruction which fully incorporates the teaching for transfer. With this instruction is the recognition that students can transfer, the skill of transfer must be taught, and the teaching of transfer is a process.

Appendices

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Appendix A
Student Essay

Make two or more connections between what happens at school and your every day life. Write in paragraph form.

Connection 1:

Connection 2:

Connection 3:

Connection 4:

Connection 5:

Paragraph 1:

Paragraph 2:

Appendix A continued

Paragraph 3:

Paragraph 4:

Paragraph 5:

Analogies # ____ Name: _____

Choose the best word which would demonstrate the relationship between the statements. Then write the corresponding letter on the blank line at the beginning of the sentence.

_____ 1. lose : recover :: _____ : remember

a. swim b. forget c. lost d. memory

_____ 2. razor : _____ :: hammer : pound

a. nail b. bat c. shave d. blade

_____ 3. suitcase : _____ :: sofa : furniture

a. luggage b. chair c. shirt d. bicycle

_____4. Bermuda : Cyprus :: _____ : Mediterranean

a. triangle b. Caribbean c. beaches d.Cuba

_____5. stomach : _____ :: heart : circulation

a. eating b. digestion c. division d. blood

_____6. touch : see :: tangible : _____

a. visible b. fingers c. orange d. pliable

_____7. find : _____ :: search : explore

a. dig b. Columbus c. lost d. discover

_____8. dog : canine :: cat : _____

a. reptile b. feline c. kitten d. female

_____9. _____ : crew :: teacher : faculty

a. sailor b. boat c. crow d. principal

Appendix B continued

_____10. arctic : north :: _____ : south

a. east b. polar c. equator d. antarctic

_____11. Memorial Day : Labor Day :: May : _____

a. parades b. calendar c. Christmas Day d. September

_____12. attract : repel :: agree : _____

a. shampoo b. compromise c. disagree d. insect

_____13. boil : _____ :: freeze : ice

a. steam b. stove c. egg d. snow

_____14. composer : symphony :: _____ : novel

a. librarian b. artist c. author d. pages

_____15. inhale : exhale :: _____ : carbon dioxide

a. Clinton b. lead c. rain forests d. oxygen

_____16. mane : _____ :: comb : rooster

a. chicken b. tail c. hair d. horse

_____17. 25% : 1/4 :: _____ : 2/5

a. 20% b. 50% c. 40% d. 70%

_____18. farmer : crops :: teacher : _____

a. students b. principal c. corn d. janitor

_____19. New York : Hudson :: New Orleans : _____

a. Nile River b. Mississippi River c. Louisiana d. Amazon River

_____20. Hamlet : _____ :: Odyssey : Homer

a. Romeo b. Simpson c. Wilbur d. Shakespeare

_____21. grassy : _____ :: meadow : beach

a. sandy b. mow c. dune d. sticky

_____22. _____ : bake :: knife : slice

a. cake b. oven c. cut d. fork

_____23. aren't : isn't :: _____ : doesn't

a. wouldn't b. didn't c. don't d. can't

_____24. Vol. : _____ :: No. : number

a. volume b. yes c. three d. area

_____25. teeth : _____ :: hand : grasp

a. dentist b. hard c. pinch d. bite

_____26. choose : choice :: think : _____

a. chosen b. drink c. thought d. brain

_____27. actor : cast :: _____ : band

a. conductor b. stage c. concert d. musician

_____28. majority : more :: _____ : less

a. population b. minority c. money d. long

_____29. C : _____ :: F : Fahrenheit

a. Calcium b. Concentrate c. Celsius d. Celebration

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Appendix B continued

_____30. snake : serpent :: _____ : swine

a. slither b. squirrel c. Eve d. pig

_____31. cable : electricity :: aqueduct : _____

a. wire b. water c. tunnel d. tape

_____32. _____ : noun :: adverb : verb

a. preposition b. adjective c. interjection d. conjunction

_____33. _____ : Columbus :: invent : Edison

a. construct b. light bulb c. create d. discover

_____34. quench : thirst :: _____ : problem

a. solve b. question c. drink d. avoid

_____35. oboe : woodwind :: trumpet : _____

a. percussion b. horn c. band d. coronet

Appendix C
Essay Posttest

Name _____
Date _____

Learning should be transferred. What we learn can connect from classroom and it can connect from the classroom to life in general. Think back on this year's learning and identify some of these connections. Space is provided below for brainstorming; then write five complete paragraphs explaining the connections you see.

Near

Far

Appendix C continued

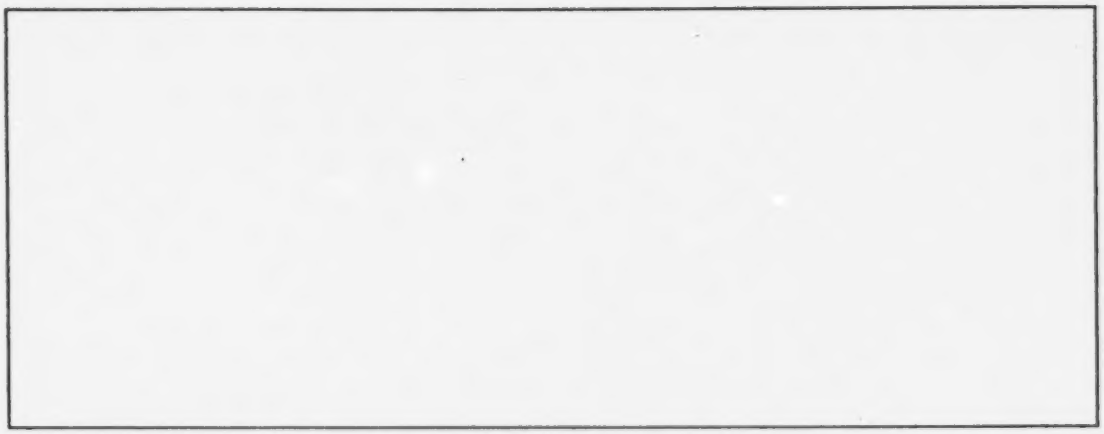
Paragraph 1

Paragraph 2

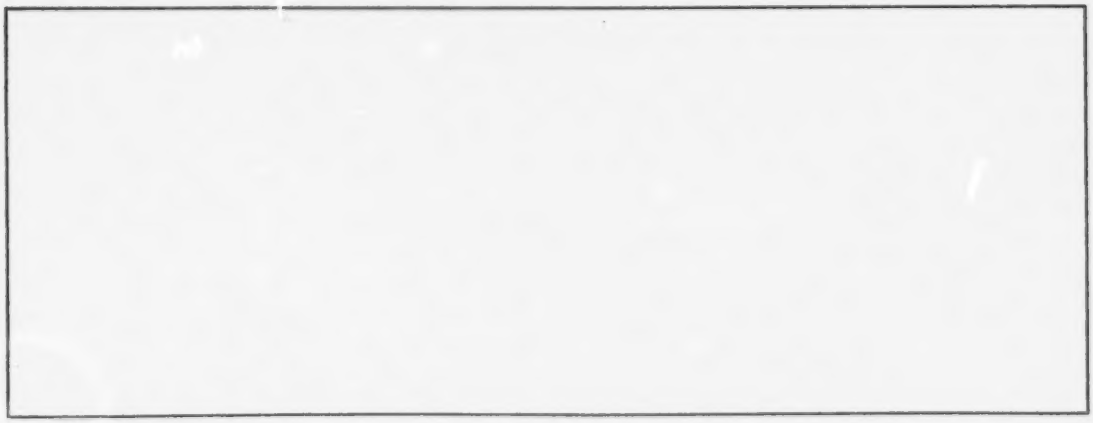
Paragraph 3

Appendix C continued

Paragraph 4



Paragraph 5



Appendix D
Parent Survey

Dear Parents,

We are almost finished with our masters degree work at Saint Xavier University. Over the past several months we have been emphasizing thinking and transferring knowledge across our curriculum and even beyond school. From observation and written school work we have noticed improvement. Now we would like your input.

In what ways have you noticed a change in your child's thinking over the past six months?

In what areas have you seen your child transferring the knowledge he or she has gained in the school setting to home situations? Please give examples and explain.

Other comments or observations which you believe would be helpful to us as we finish our gathering of information and begin analysis.

Please complete and return by Thursday, March 13.

Sincerely,
Mark Branderhorst
Terry Huizenga
Kristin Kruzich

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